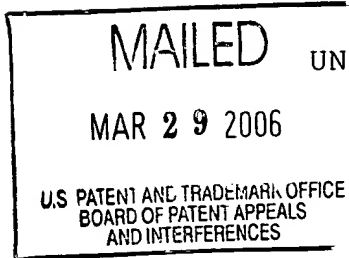


The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Ex parte JOHN C. WALDROP III, BRUCE HARSHMAN,  
WILLIAM R. BURKETT, ALAN F. TEGELER,  
CARMINE JOHN SESTI and WES P. WEINMAN

Appeal No. 2006-0772  
Application No. 09/731,945

ON BRIEF

Before KIMLIN, JEFFREY T. SMITH and FRANKLIN, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1, 4-8 and 10-12. Claim 1 is illustrative:

1. A vacuum-assisted resin transfer molding process for making a laminate, comprising the steps of:
  - (a) assembling a preform from suitable reinforcement, in a mold;
  - (b) tackifying the preform with a tackifier containing toughening agents for improved damage tolerance in the mold to produce a tackified preform;

- (c) vacuum debulking the tackified preform;
- (d) double bagging the debulked preform with an inner bag and outer bag using high elongation, low modulus nylon bagging films sufficient to control bag relaxation and to improve vacuum integrity while minimizing bag wrinkles;
- (e) enclosing an open weave flow control media between the inner bag and the debulked preform to control the flow front during resin infusion, the flow media having permeability to control the infusion flow and to create flow resistance by using fill fibers to act as weirs to an infusing resin, wherein the flow media also is able to withstand exposure to temperatures up to about 600°F, is chemically inert, and is sufficiently stiff and pliable to eliminate markoff on the bag side of the laminate; and
- (f) infusing resin into the debulked preform through the flow media using a vacuum-assisted resin transfer molding process using a series of vacuum ports spaced around the perform.

The examiner relies upon the following references as evidence of obviousness:

Stoeberl	4,120,632	Oct. 17, 1978
Johnson	4,132,755	Jan. 02, 1979
Shepherd	5,129,813	July 14, 1992
Imanara et al. (Imanara)	5,364,584	Nov. 15, 1994
White et al. (White)	5,427,725	June 27, 1995
McClure et al. (McClure)	6,090,335	July 18, 2000
Jean et al. (EP '438) (European Patent Application)	0 816 438 A2	July 1, 1998

Appellants' claimed invention is directed to a double vacuum bag molding process for infusing resin into a preform. The

Appeal No. 2006-0772  
Application No. 09/731,945

process finds utility in making products for a wide variety of industries, including aerospace.

The appealed claims stand rejected under 35 U.S.C. § 103(a) as follows:

(a) claims 1 and 6-8 over Johnson in view of White, EP '438, Shepherd and McClure;

(b) claims 4, 5 and 10 in view of the combination of references stated in (a) above further in view of Imanara;

(c) claim 11 over the combination of references stated in (a) above further in view of Stoeberl; and

(d) claim 12 over Johnson in view of Stoeberl.

We have thoroughly reviewed each of appellants' arguments for patentability. However, we are in complete agreement with the examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the examiner's rejections for essentially those reasons expressed in the Answer, and we add the following primarily for emphasis.

We concur with the examiner that Johnson, like appellants, discloses a vacuum-assisted resin transfer molding process for making a laminate wherein the preform is debulked and double

bagged in a mold, and infused with a resin. As recognized by the examiner, Johnson does not disclose tackifying the preform with a tackifier that contains a toughening agent, but Johnson does teach the application of an adhesive to provide a tacky substance on the preform. In addition, the examiner correctly points out that both White and EP '438 disclose tackifying a fiber-reinforced composite before molding, and EP '438 demonstrates that it was known in the art to use a tackifying elastomer that is also a toughening additive (see column 2, last paragraph). Accordingly, we are satisfied that one of ordinary skill in the art would have found it obvious to tackify the preform of Johnson with a tackifier containing toughening agents.

The examiner also appreciates that Johnson does not expressly teach a low modulus, high elongation nylon vacuum bag that minimizes bag wrinkles. However, Shepherd establishes that the use of such nylon films in vacuum bag molding processes was known in the art. Accordingly, we find that it would have been obvious for one of ordinary skill in the art to employ the nylon film of Shepherd in the vacuum bag molding process of Johnson. We note that appellants acknowledge that they do "not claim to have invented low modulus, high elongation vacuum bags" (page 9

of principal brief, last paragraph). While appellants submit that their "invention is a method that uses such bags to produce aerospace composites" (id.), the claims on appeal define vacuum-assisted resin transfer molding processes, in general, and appellants have not explained why the use of such known films would have been unobvious to one of ordinary skill in the art.

The examiner also notes that the process of Johnson does not utilize the claimed open weave flow control media between the inner bag and the debulked preform to control the flow front of the resin infusion. However, we find no error in the examiner's reliance on McClure for establishing the obviousness of using such a flow control media in a vacuum resin infusion process of the type disclosed by Johnson. We are not persuaded by appellants' argument that it is illogical to use McClure's flow control medium in the process of Johnson because Johnson creates resin distribution channels in the bagging material, and it would be unnecessary to provide "two elements to perform the same function when either one would do fine along [sic, alone]" (page 10 of principal brief, second paragraph). We find nothing unobvious or illogical in employing such a flow control medium in the Johnson process in order to ensure the uniform distribution of the resin. Certainly, it would have been obvious for one of

ordinary skill in the art to err on the side of caution while remaining mindful of the cost/benefit analysis with respect to the use of the flow control medium. While appellants maintain that "McClure actually teaches not to use such flow media because it requires labor to place it . . ." (page 10 of principal brief, third paragraph), McClure provides the relevant disclosure that "[c]ontemporary techniques for facilitating more uniformed or homogeneous resin distribution include the use of cloth material adjacent the fiber lay-up [which] forms a screen or matrix of open spaces which tends to wick the resin, and thereby facilitates resin flow" (column 1, lines 49-53).

Appellants do not set forth a separate substantive argument for the rejection of claims 4, 5 and 10 over the further citation of Imanara, i.e., appellants do not contest the examiner's conclusion that "[i]t would have been obvious for one of ordinary skill in the art to have tilted that mold assembly as taught by Imanara" (page 8 of Answer, last paragraph).

Regarding separately argued claim 11, we fully concur with the examiner that Stoeberl evidences the obviousness of throttling the vacuum line to provide uniform distribution of resin throughout the fiber reinforcement.

- Appeal No. 2006-0772  
Application No. 09/731,945


Appellants further contend that "[t]he rejection should also be withdrawn simply by recognizing that the skilled artisan would never combine teachings from five different references" (page 10 of principal brief, last sentence). However, it is well settled that the number of references relied upon does not, in itself, militate against a conclusion of obviousness within the meaning of § 103. Manifestly, if a claim recites five conventional features, it may well require five separate references to establish their obviousness. In the present case, inasmuch as the applied references are all directed to vacuum molding processes, we are confident that one of ordinary skill in the art would have routinely resorted to their disclosures in making obvious modifications to the vacuum bag molding process of Johnson. We note that appellants base no argument upon objective evidence of nonobviousness, such as unexpected results, which attaches criticality to any of the claimed features either alone or in combination.


In conclusion, based on the foregoing and the reasons well-stated by the examiner, it is our judgment that the evidence of obviousness presented by the examiner outweighs the arguments for nonobviousness presented by appellants. Accordingly, the examiner's decision rejecting the appealed claims is affirmed.

Appeal No. 2006-0772  
Application No. 09/731,945


No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (effective Sep. 13, 2004; 69 Fed. Reg. 49960 (Aug. 12, 2004); 1286 Off. Gaz. Pat. Office 21 (Sep. 7, 2004)).

AFFIRMED

  
EDWARD C. KIMLIN )  
Administrative Patent Judge )

  
JEFFREY T. SMITH )  
Administrative Patent Judge )

BOARD OF PATENT  
APPEALS AND  
INTERFERENCES

  
BEVERLY A. FRANKLIN )  
Administrative Patent Judge )

ECK:clm



~~Appeal No. 2006-0772~~  
Application No. 09/731,945

John Hammar  
The Boeing Company  
MC 13-08  
P.O. Box 3707  
Seattle, WA 98124